

## Problem 14

Consider the initial value problem

$$y'' + \gamma y' + y = \delta(t - 1), \quad y(0) = 0, \quad y'(0) = 0,$$

where  $\gamma$  is the damping coefficient (or resistance).

- (a) Let  $\gamma = \frac{1}{2}$ . Find the solution of the initial value problem and plot its graph.
- (b) Find the time  $t_1$  at which the solution attains its maximum value. Also find the maximum value  $y_1$  of the solution.
- (c) Let  $\gamma = \frac{1}{4}$  and repeat parts (a) and (b).
- (d) Determine how  $t_1$  and  $y_1$  vary as  $\gamma$  decreases. What are the values of  $t_1$  and  $y_1$  when  $\gamma = 0$ ?